ASSESSMENT OF SOURCES AND MAGNITUDES OF LOADS OF DRINKING WATER CONSTITUENTS OF CONCERN

DRAFT WORK PLAN

Revised 01/12/00; 01/19/00

Funding

This CALFED Work Plan describes the scope of work to be done in Part 1 and Part 2 of the Assessment of Sources and Magnitudes of Loads action listed in the CALFED Revised Programmatic EIR/S, June 1999. The Assessment of Baseline Conditions, Part 1 of this action, is funded for $150,000. Funding for Drinking Water Monitoring, Part 2 of this action, is $550,000. This Work Plan is to be regarded more of a vision of both short and long term drinking water quality actions and studies. The funding for future fiscal years has not been determined. Realistically, only several of the tasks below can be carried out with the funding approved for FY 2000.

Objective

The objective of Part 1 of this study is to determine **baseline** water quality conditions under various hydrologic conditions and operational scenarios. Baseline water quality conditions must be determined and agreed upon by consensus of stakeholders participating in the CALFED process so that changes in Delta water quality resulting from CALFED actions and the effectiveness of water quality actions can be evaluated. The findings from Part 1 will also be used to refine existing tools and to identify monitoring and research gaps.

The objective of Part 2 of this study is to improve our understanding of the current information, to identify and perform monitoring and research to determine **changes** as a result of CALFED activities, and to help prioritize future actions to reduce loadings of drinking water constituents of concern.

Key Research Questions

1. What are the sources, concentrations, and loadings of constituents of concern at benchmark locations?
    a. Sacramento River
    b. San Joaquin River
    c. Tributaries to the Delta
    d. Delta
    e. Exchange Locations
    f. Water Treatment Plant Intakes
2. How do the concentrations and loadings vary seasonally and historically?
3. How do the concentrations and loadings vary spatially, and on tidal, neap cycle, seasonal, and interannual (hydrologic years) timescales?
4. How do concentrations and loadings vary:
    a. Temporally and spatially?
    b. With flow rate?
    c. With storm events?
    d. With flow releases from upstream reservoirs?
5. How do operational conditions affect concentrations?
6. How does barrier operation affect concentration/location of constituents of concern?
7. How does the combination of barriers, operations, and in-Delta flow modifications affect concentrations?
8. How do biological system parameters affect variability in the core parameters? (Core parameters: TOC, DOC, UVA 254)
9. How do loads of carbon from different sources at different times affect core parameters?
10. How does variability of the core parameters link to carbon quality.

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11. Which DOC quality characteristics impact the formation of various DBPs and which DOC sources exhitit these characteristics?

Note: Research related to dissolved organic carbon release from Delta wetlands has been funded by CALFED and is principally led by investigators from the U. S. Geological Survey – "Dissolved Organic Carbon Alternations, and Implications for Drinking Water Quality and the Delta Foodweb Part 1 (Compositional Characteristics) and Part 2 (Fluxes and Loads from Tidal and Non-Tidal Wetlands and from Agricultural Operations). Therefore, the research questions leading to these studies are not repeated here.

Constituents of Concern or Surrogates

1. Disinfection Byproduct Precursors (TOC/DOC/Br)
2. UVA 254 (indicator)
3. Quality/Reactivity of organic carbon
4. Total Dissolved Solids
5. Pathogens/coliforms
6. Nutrients (nitrogen and phosphorus)
7. Temperature and algal growth
8. Salinity
9. Chlorophyll
10. Turbidity

Benchmark Locations

1. Sacramento River
    a. Upstream of Colusa Basin Drain
    b. Alamar Marina/Veterans Memorial Bridge
    c. Freeport
    d. Greene's Landing/Hood
    e. Other available Sacramento River sites

2. San Joaquin River
    a. Location near Friant Dam
    b. Vernalis/Mossdale
    c. Below Mendota Pool
    d. d. other available San Joaquin River sites

3. Tributaries to Delta
    a. deep water channel (Fred Lee to provide specific site)
    b. American River
    c. Feather River
    d. Mokelumne
    e. Tuolumne
    f. Stanislaus
    g. Merced
    h. Consumnes

4. Delta
    a. Barker Slough Pumping Plant
    b. Banks Pumping Plant
    c. Tracy Pumping Plant
    d. Rock Slough Pumping Plant (Contra Costa Water District Pumping Plant #1)
    e. Contra Costa Water District intake on Old River
    e. Selected Delta channel locations

5. Exchange Locations (Connected to Ops Work Group)
    a. DMC at McCabe Road
    b. Check 13
    c. O'Neill Pumping Plant
    d. Kern River Intertie (upstream of Check 29)
    e. Other locations where monitoring is already occurring

6. Water Treatment Plant Intakes
    a. North Bay Aqueduct - NBA Regional, Benicia
    b. South Bay Aqueduct - SCVWD, ACWD, Zone 7 -
    c. Pacheco
    d. Bollman Water Treatment Plant (CCWD)
    e. Randall Bold Treatment Plant (CCWD)
    f. Waste water discharge (new and expanded sources)
    g. Storm water discharge (new and expanded sources)
    h. San Luis Reservoir tunnel island intake???
    i. Jensen
    j. Mills
    k. Avek
    l. Coastal Location – Polinio (CCWA)

Contaminant Sources

1. Wastewater discharges
    a. Sacramento Regional Plant
    b. Stockton
    c. Other larger dischargers (Roseville, Redding, Modesto)
    d. Sacramento Combined Stormwater System
    e. Existing and new sources and expanded sources

2. Stormwater discharges
    a. Sacramento City/County
    b. Stockton (Consider TMDL Program)
    c. Modesto
    d. Existing and new sources and expanded sources

3. Sacramento River watershed agricultural drainage
    a. Colusa Basin Drain
    b. Sacramento Slough
    c. Natomas East Main Drainage Canal (mix of ag/urban)

4. San Joaquin River watershed agricultural drainage
    a. Mud and Salt Sloughs

5. Delta island drainage

6. Seawater

7. Wetlands and Riparian Areas

8. Delta Processes – Hyacinth/Algae Growth

9. Industrial Discharges

10. Animal Enclosures

11. Other CALFED Actions

PART 1 – Assessment of Baseline Conditions.

Task 1 (Part 1)

A. Analyze existing data at key benchmark locations and analyze predictive capabilities:

1. Historical simulation of Br, TDS/EC
2. Identify differences with observed existing data
3. Calibrate model to existing flow data
4. Assess differences
5. Develop work plan for refining model and filling data gaps linking Delta-wide modeling and site-specific actions

(Workplan tasks from Archibald; also see USGS proposal for assessing organic carbon loads; the second thing USGS proposes is to provide scientific review/direction of the planned analysis of existing Delta water quality data)

B. Determine data sufficiency

1. Matrix of parameters and locations with notations on sampling frequency, period of record, etc.
2. Review research questions to determine if data are sufficient to answer them.

(Workplan tasks from Archibald)

C. Determine data analysis techniques and data presentation for each research question.

1. Time series plots of concentrations and loads
2. Time series analysis
3. Other statistical analysis (linear regression, mean, median, etc.)

(Workplan tasks from Archibald)

Task 2 (Part 1)

Gather and synthesize existing information on riverine loadings, urban runoff, POTW's, recreational boats, agriculture and aquatic plants.

(Workplan tasks from Kratzer, Taylor)

Task 3 (Part 1)

Transfer of POTW monitoring data (flow and concentration) into electronic media.

(Workplan tasks from Bruns)

Task 4 (Part 1)

Modeling Analysis

1. Historical Simulation (BR, TDS/EC, TOC/DOC)
2. Baseline Simulation (BR, TDS/EC, TOC/DOC)

(Workplan tasks from Hutton)

Task 5 (Part 1)

Develop and set up data management system to store drinking water data.

(Workplan tasks from Jacobs; database should be compatible with DHS data management system)

PART 2 – Monitoring Changes, Research, Improving Predictive Capabilities

Task 1 (Part 2)

A monitoring network will be designed to collect data to fill critical gaps identified in Part 1 findings, to track water quality changes over time, and for comparison to model simulations.

1. Real time monitoring for organic carbon in the Sacramento-San Joaquin Delta
2. Measure agricultural return flows and develop more precise information on agricultural loading.
3. Conduct reconnaissance of discharges from recreational boat to determine whether such discharges are a significant source of pathogens.
4. Pathogen monitoring of watershed.

(Workplan tasks from Wendt; have received tasks for #1)

Task 2 (Part 2)

Continue to compile and assess future monitoring data collected by ongoing monitoring programs to help assess changes in Delta water quality. Existing programs include: DWR MWQI Program, DWR O&M, USGS, SRWP and CMP, Water Agencies, ICR data, NPDES, Storm Water Monitoring Programs, SFEI, hydrological data sources (models, pumping rates at Banks and Tracy, CDEC, USGS).

(Workplan tasks from Wendt)

Task 3 (Part 2)

Perform investigations into the hydrodynamic process and determine its effect on concentrations of constituents of concern.

(Workplan tasks from Hutton)

Task 4 (Part 2)

Side-by-side site and instrument calibration (MWQI to perform TOC monitoring) at a high frequency monitoring site.

(Workplan tasks from Taylor)

Task 5 (Part 2)

Develop and improve forecast abilities which links Delta-wide models to site-specific changes.

(Workplan tasks from Hutton)

Task 6 (Part 2)

Develop data management system for existing and new drinking water quality data and research results.

(Workplan tasks from Jacobs)

Task 7 (Part 2)

Provide information necessary to establish effectiveness of specific source control and management actions.

(Workplan tasks from Bruns)